# A JOINT SUPPLEMENT FROM THE INSTITUTE FOR SUPPLY MANAGEMENT® AND INBOUND LOGISTICS







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#### elcome to the inaugural edition of Inside Logistics,

an editorial collaboration between the Institute of Supply Management and Inbound Logistics. Putting together the resources and expertise of these two entities provides you with an overview of the growing collaboration between

procurement and supply management and logistics functions.

This collaboration is rooted in history. *IL's* parent company, Thomas Publishing Company, shares a 100-year relationship with the purchasing procurement and supply managers organization, which was founded in 1915. In fact, one reason Thomas Publishing created *Inbound Logistics* was to encourage purchasing managers to work more closely with logistics managers in a new discipline we call demand-driven logistics.

To continue and expand on this longstanding partnership, we're proud to present this first in a series of shared content offerings.

The cooperation between procurement and supply chain management is obvious in the four articles we selected for this inaugural offering. You'll see how pursuing emerging markets benefits from closer linkage between supply chain functions; how an evolution in logistics practices reflects tighter integration between supply, demand, and logistics; how all functions must work collaboratively across the supply chain to ensure safe handling of hazardous materials and end-to-end chain of custody controls; and how expeditious deployment of medical, humanitarian, and logistics teams helped fight the deadly Ebola outbreak.

Inbound Logistics readers understand full well how tighter integration with purchasing/procurement, combined with demand-driven logistics practices, can enhance the competitive position of any enterprise as these functions co-evolve, collaborate, and cooperate.

Filecia Stratton



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The magazine for demand-driven logistics, Inbound Logistics provides complete and up-to-date supply chain content including case histories, research, and decision support available in print, digital, and tablet editions. Its mission is to provide today's business logistics managers the information they need to speed cycle times, reduce inventories, and get closer to their markets and customers.

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### Emerging Markets Demand Better Global Intelligence

Before planting a flag in an emerging market, shippers need to conquer specific challenges; some ally with a 3PL as ammunition.

By Beth Goodbaum

S MORE COMPANIES SHIFT OPERATIONS TO EMERGING markets, they are looking for third-party logistics (3PL) providers offering global-wide strategies to conquer challenges that pose a threat to business. Longstanding cultural and language barriers aside, there is a growing need to develop first-rate operating models that provide visibility, security, and educated talent to keep up with supplier needs. A few core emerging markets–Mexico, Colombia, Turkey, Poland, and Vietnam– have become established sourcing sites due to their attractive exports and cost efficiency. But each country reveals a unique set of challenges.

When conducting business operations abroad, it's imperative for shippers to remember that the well-established practices they are familiar with in the United States, including labor laws, infrastructure, security, and technology are often radically different in global markets.

"Shippers who enter emerging markets with the mindset that 'it works in the United States and Europe, so it should work here' tend to struggle the most," says Brett Bissell, chief operating officer of contract logistics at CEVA Logistics, a global 3PL. "Shippers who are ready and prepared to be flexible will more quickly launch their overseas operations successfully."

Bissell recommends that shippers consider several key points when expanding business in unfamiliar markets, including labor laws, which can be radically different from country to country, and also within a country's regions. He emphasizes the dangers of importing a copy-paste process or approach from a more developed country, which might result in increased costs or unsustainable liabilities. If using a 3PL, Bissell recommends choosing one with local teams who can review the correct processes in detail, and suggest optimal solutions that cut costs and offer flexibility.

Local 3PL teams must be aware of technological challenges, especially in regions where traditional platforms are not supported. Another major consideration is infrastructure. "Pointto-point distances on a map do not indicate the optimal logistics network," Bissell says. This is another area where local teams can discuss the larger strategic growth objectives.

While some of these challenges are universal, others are specific to some of the top emerging markets.

#### MEXICO: ACCOUNTABILITY, TRANSPARENCY, VISIBILITY

Divided by a 2,000-mile border, Mexico and the United States have strong export ties. In 2013, Mexico was the United States' second-largest goods export market, and the third-largest supplier of goods imports. The North American Free Trade Agreement (NAFTA) helped bolster business due to its market-opening rules, which provided opportunities for increased trade relations.

In recent years, Mexico has presented cost-savings opportunities to companies choosing to nearshore operations in an effort to cut time to market, reduce inventory warehouse space, speed cash-to-cash cycles, and cut transportation costs, notes Troy Ryley, managing director of Transplace Mexico, a 3PL that maintains a primary operations center in Monterrey, supported by operations and personnel in Mexico City, El Paso, Nuevo Laredo, Laredo, Puebla, San Luis Potosi, and a few smaller cities. An increasing number of U.S. retailers are shifting operations to the country to avoid the costly and complex processes involved in moving products across the U.S.-Mexico border, he adds.

Despite such attractive prospects, working with the country can pose a risk to the flow of operations. Missing across the Mexican supply chain are accountability, transparency, and visibility. In terms of imports and exports, shippers are prone to miscommunication as a result of multiple points of contact during the supply chain process.

"A shipper moving cargo must effectively communicate with up to five groups involved in the process, including a U.S. carrier, a U.S. customs broker, a Mexican forwarder, a Mexican crossing agent, a Mexican customs broker, and a Mexican trucking company," Ryley says. "Because multiple parties and hand-offs are involved, shippers often become frustrated and lose track of freight at the border."



Companies that do business in emerging markets such as Mexico often partner with third-party logistics providers to tap their expertise. Penske Logistics, for example, has extensive experience in supply chain management in Mexico, including operating this Querétaro crossdock.

Identifying and managing expectations of operational responsibilities and processes can be challenging and requires top-of-the-line communication. "As a best practice, trading partners should create communication that aligns the involved parties with the desired service outcomes, and establish a process that defines clear accountabilities and is supported by a contingency plan," says Mike Burkhart, director of Mexico for C.H. Robinson, a 3PL that has been operating in Mexico for 25 years. "This type of proactive communication helps simplify the complex nature of cross-border shipments between the United States and Mexico."

As they face the complexities of intra-Mexico and cross-border freight transportation, more shippers are looking for an experienced partner to optimize and manage the process, Ryley adds. "Transplace, for example, works with shippers to help them understand the stringent regulations and ensure compliance," he says. "We also employ a bilingual Transportation Management System (TMS), which features capabilities tailored for the Mexican market."

Tax law changes are another top challenge shippers face when working with Mexico, says Mike Cassidy, managing director of Penske Logistics Mexico. He notes that Penske has worked to understand laws and stay ahead of changes by making significant investments in systems to help the company and its shipper clients adapt.

"An additional challenge is highway infrastructure," says Cassidy. "Mexico needs continued investment to improve its roads and bridges. And, with more companies bringing their business to Mexico, there needs to be a huge focus on creating an improved highway system."

#### **COLOMBIA: INFRASTRUCTURE CHALLENGES**

Infrastructure is also a concern in Colombia, the United States' 21st-largest goods trading partner, with \$40 billion in total (twoway) goods trade during 2013. The country is plagued by a vastly underdeveloped transport network, due to its mountainous regions, insufficient funds, violence, and overall corruption.

To put it in a global perspective, Colombia's quality of overall

infrastructure ranks 104 out of 148 countries, according to the 2014-2015 World Economic Forum.

In working with countries vulnerable to security threats, Ty Bordner, vice president of solutions consulting at global trade management solutions provider Amber Road, refers to the Customs-Trade Partnership Against Terrorism (C-TPAT). This initiative allows for better risk assessment and targeting, and frees U.S. Customs Border Protection to allocate resources to more questionable shipments.

"The rest of the world is copying programs like C-TPAT, so each country may operate their program under a different name," says Bordner. "These programs are designed by the developing nations, the United States, and Europe, to vet

their suppliers from a security standpoint."

#### **TALKING TURKEY**

Part of the MINT group of countries (the others are Mexico, Indonesia, and Nigeria), Turkey is one of the top emerging markets, with an expanding manufacturing sector driving food, textile, clothing, iron, and steel exports. Turkey is currently the United States' 34th-largest goods trading partner, with \$18.7 billion in total (two-way) goods trade in 2013, according to the United States Trade Representative. Goods exports totaled \$12.1 billion; goods imports totaled \$6.7 billion during the same year.

"Turkey's economy has been growing and is expected to grow six to seven percent in the next five years," says Matt Goker, general manager of ATA Freight Line, a global provider of fully integrated supply chain solutions, with a specialization in agricultural machinery. "It has a young workforce, which presents a lot of opportunities for business." products through UPS and FedEx, and emphasizes how this type of visibility is surprisingly not common on the commercial side within Turkey.

As a solution to visibility challenges, many logistics providers offer real-time solutions. For example, ATA Freight Line offers Vizio, a company under the group of ATA companies that provides real-time shipment information. "We get 90,000 data points every day, and one good part about this system is acquiring that many data points," Goker explains. "This allows us to run statistics and analysis; the tools give us predictability about how shipments will move months from now. We factor in weather conditions, political risks, and other variables that impact transit time."



CEVA's global network covers more than 170 countries with 1,000-plus sites. The 3PL leverages its sector-focused expertise, global and local resources, and advanced technologies to deliver supply chain services to shippers exploring emerging markets.

Goker has witnessed the biggest shift in Turkey's trade within the past 10 years. "When

I started out in sales, we were seeing a huge amount of textile garment business flowing out of Turkey into the United States, and many Turkish manufacturers were not well-known, which presented some trade risks."

Since then, as the country moved away from banned, lowquality production to quality-oriented premium products, it created a more alluring environment for potential business, especially in key areas of industrial commodities such as spare parts for automotive production.

As infrastructure grows more challenging in Turkey, visibility becomes increasingly important. "Visibility is more important in Turkey than in the United States, because shippers don't have the support from key suppliers that would give them the needed visibility," says Goker. He points to the efficiencies of tracking Such a system provides a well-educated guess as to where a shipment is at any point in a given year, which is especially crucial because there are a fewer number of truckers in Turkey that can provide detailed shipment information.

#### POLAND: BUILDING A FRAGMENTED INFRASTRUCTURE

While much of Europe struggled with the global financial crisis over the past several years, Poland experienced GDP growth of more than 20 percent between 2008 and 2013, according to the Department of Commerce. In 2013 alone, the United States sold \$3.9 billion worth of merchandise in Poland, up 16.5 percent from 2012.

Even with business growing in the country, shippers can face

the same problems trading with Poland, such as bureaucratic barriers and a tax system that impedes business.

"One main transport and logistics challenge is dealing with fragmented Polish infrastructure," says Tom Sullivan, general manager at C.H. Robinson's Warsaw office. C.H. Robinson opened its first Polish office in 1997. In September 2012, the company acquired Apreo Logistics, a freight forwarder based in Warsaw.

"While infrastructure from Warsaw to the western part of the country is extremely developed, other routes that travel from the

"If using a third-party logistics provider to help meet global challenges, choose one with local teams who can review the correct processes in detail, and suggest optimal solutions that cut costs and offer flexibility."

north to the south are slow and premature," Sullivan explains, warning that U.S. companies need to be aware that there are no major highways connecting lines of transportation that are similar to the U.S. highway system, which can pose complications for truckers serving those routes.

Another challenge stems from economic issues due to geopolitical activity. "The recent German labor law increasing the country's minimum wage consequently changed the way carriers in the European Union do business," says Sullivan. The dissimilar currency exchanges between the two countries have heavily impacted transportation costs in Poland.

To help its shipper customers alleviate some key challenges facing logistics, and to streamline processes, C.H. Robinson uses its Navisphere technology platform to give better visibility to operations, with access to an online platform that allows businesses to view and manage shipments abroad.

"As automation becomes a mainstream strategy for creating business efficiencies in Poland, as it has in the United States, these tools will continue to help shippers mitigate risk and reduce cost with more streamlined supply chain processes," Sullivan explains.

#### **VIETNAM: FINDING THE RIGHT SUPPORT**

In Vietnam, which boasts an attractive market for machinery, cotton, and apparel, working with talent has shifted 3PL operations. "Vietnam is a pretty interesting market for our customers for two reasons," says CEVA's Bissell. "Just as in China, there is an available workforce that the government is looking to help develop, so it's an attractive place from that perspective. But it's also an attractive place because the market itself is growing. I've been visiting Vietnam over the past several months, and even

> during this short period, roads are getting built, and airports are brand new. "The government is investing heavily in helping the country grow, and I think it's having a big effect."

> Bissell adds that many of CEVA's customers are either establishing presences in the country or actively thinking about it, which prompted the company to set up a freight management system there.

> Challenges within Vietnam include an unsophisticated workforce. "In most countries you do business with, the workforce has been through several jobs. They understand what is expected of them, and they know how to approach the work that you're offering," says Bissell.

In Vietnam, where footwear and apparel have a strong and growing presence, workers are new to established processes. "They need more hand-holding, and a much more basic level of training than some of the other geographies," he explains.

Workforce is critical now, especially when Vietnam needs to drive up its productivity growth performance as the country's labor force is expected to decelerate over the next decade, according to a 2012 McKinsey Global Institute report. "One issue we're finding within Vietnam is the need to translate more of the materials and tools that we use," says Bissell. "We are working to ensure basic instructions are translated, and making sure that IT tools are available in both languages, and in both scripts."

To that end, though, it's imperative that businesses consider cultural differences abroad. "Local customs and culture flow directly into management operations and execution processes," says Burkhart. "It is important to be flexible to adapt to these differences in order to produce a more desirable outcome."

Perhaps most of all, he notes, developing a genuine appreciation for culture differences can improve business outcomes.

Beth Goodbaum is a contributing editor for Inbound Logistics.



### **A Logistics Evolution**

Trends and challenges in today's supply chains mean evolving logistics networks must be prepared to deliver results in an everchanging business environment.

#### **By Mary Siegfried**

EMANDING CUSTOMERS, COMPLEX SUPPLY CHAINS AND EVERchanging relationships with third-party logistics providers are prompting supply management practitioners to closely examine the adaptability and agility of their logistics networks. And that's a good thing, experts agree, because logistics will play an ever-greater role in delivering high-performing results.

Over the past 40 years, logistics, an integral part of supply management, has evolved along with the changes that have taken place in business. Up until the 1980s, logistics was largely regarded as a field that required "strong backs and not much thinking," explains H. Donald Ratliff, executive director, Supply Chain & Logistics Institute at Georgia Institute of Technology. But all that changed in the 1980s, he says, as ERP systems allowed analysis of data and greater automation. The evolution continued in the 1990s with manufacturing growth in China, the emergence of complex supply chains and the realization that departments could no longer operate in silos. Ratliff says the 2000s brought improved supply chain visibility and communications, explosion of mobile devices, continued globalization and the start of online sales.

The introduction of cloud computing, Software-as-a-Service and Business-Processes-as-a-Service in the



2010s, Ratliff says, rounds out the logistics revolution.

However, the revolution is far from over because there are several new challenges and trends affecting logistics networks. Some of the challenges and trends we'll examine include:

- Flexible fulfillment and omnichannel
- Improved logistics integration
- Changing 3PL roles/relationships.

#### FLEXIBLE FULFILLMENT, OMNICHANNEL

Meeting the needs of today's demanding customers, who expect an "always-on, always-open" shopping experience, is a challenge and opportunity for supply management practitioners today and into the future, says Shanton Wilcox, vice president, logistics and fulfillment leader for Capgemini Consulting in Atlanta.

Capgemini's 2015 Third-Party Logistics Study finds that omnichannel supply chains are still maturing. One-third of study respondents said they are not prepared to handle omnichannel retailing, with only 2 percent rating themselves as high-performing in omnichannel.

Wilcox says flexible fulfillment and omnichannel are prompt-

An important aspect of a high-performing logistics network is having it integrated throughout the supply chain and the company.

> ing businesses to "throw the doors wide open" as marketing creates excitement around delivery and fulfillment to improve the customer experience and extend the brand. "But it's logistics that has to deliver on those promises," he adds.

> There have been pilot programs focused on delivering products to customers wherever they are and whenever they want it. "But what I always hear from supply management professionals is they have to build something that is repeatable and scalable. They can't build a solution for New York, one for London and another for Santiago. It has to be cost-effective and efficient," Wilcox emphasizes.

> And that's where supply management and marketing have to work together to balance "wildly expanding consumer expectations" with the cost of flexible fulfillment.

> "Supply management has to be at the table to tell executives they can meet the demand, but with a cost to the company," Wilcox says. "They have to be sure customers are asked, 'If we charge you \$3.50 every time you use a delivery option, do you

still want it?' As customer requirements settle down into true business requirements, companies will determine how to build the capabilities to match the needs."

As omnichannel matures, supply management can provide a pragmatic viewpoint and set expectations, including price tags around various fulfillment options, Wilcox says. In the study, for example, companies report that their existing infrastructure can't support true omnichannel. E-commerce distribution centers are designed to pick, pack and ship partial shipments, with remaining distribution centers used for full shipments.

Retailers currently are trying to create more in-store integration with online channels, using stores as fulfillment centers for Internet shopping sites, and to facilitate online order pickups at stores. "Companies have to determine how much of their current infrastructure they are willing to take apart to build new delivery channels," the study notes.

Joel Sutherland, managing director and adjunct professor at the Supply Chain Management Institute at the University of San Diego, sees omnichannel as a challenging process issue for supply management practitioners. He recently worked with a retailer struggling with fulfillment and omnichannel issues both online and in its stores.

"The business found that online consumers would find an item, check online availability and, after being notified it was in stock, order it only to get a notice later that it was not available," he says. "Other consumers would check store availability online, receive notice the item was in the store, then drive to the store only to find it was not in stock."

Sutherland emphasizes that failures in fulfillment mean companies have failed customers' expectations. "If you think about it, consumers are more upset if a company says it has something in stock and doesn't, than if they are told from the start that the item is not available," he says.

His investigation into the problem found a major area for improvement at the store level: timely updating of inventory. When an item was sold at a store, the inventory decrement was not immediate. Store managers were waiting until the end of the day or even a few days to update inventory. Also, items were often logged as "in stock" when they were received by the stores, but they were not actually placed on shelves.

"This was a timing issue," he says. "When you receive it how fast does it go into inventory? When you sell it, how fast is inventory depleted? If your inventory is 75 percent to 80 percent accurate, you are going to have some very upset customers."

#### **IMPROVED LOGISTICS INTEGRATION**

An important aspect of a high-performing logistics network is having it integrated throughout the supply chain and the company. Sutherland says there was great excitement in the industry years ago because it was thought technology would bring about integrated logistics systems. "It has come a long way, but I think we are still stuck in neutral," he says. "We haven't really integrated an organizational structure or developed an overarching strategy that capitalizes or leverages the opportunity of such a system."

The key to breaking down barriers for an integrated logistics system is effective sales and operations planning (S&OP), Sutherland says. And S&OP is as much a cultural issue as it is a business process issue. "There has to be a collaborative culture and environment where sharing information upstream and downstream in the supply chain is valued," he emphasizes.

He recalls his work with Toyota as vice president of operations at Denso, one of Toyota's largest suppliers, which shared the Toyota Way culture and processes. Integration was practiced and valued at Toyota and its supplier companies, he says.

"Their system of integration made sure that any department that would be affected by a decision was involved upfront, including procurement, finance, manufacturing, marketing and HR," he says. "They realized that if production plans included working with your suppliers and setting up a manufacturing schedule, but failed to include planning for the labor force in the distribution environment, it all falls apart."

Sutherland saw the importance of logistics integration recently while working with a company that came to him for help with a "systems issue." He says the company was sourcing all the right materials, creating a solid supply base and planning for demand, but when the products "hit the docks and the distribution centers, they were getting hammered."

The company wasn't sharing information throughout the supply chain, leaving the distribution centers, one of the final links in the supply chain, with a manpower shortage. "It told them this was less of a systems issue and more of a cultural issue in terms of developing a collaborative environment for sharing information throughout the company," he says.

Wilcox says the trend for greater integration will be more pronounced as flexible fulfillment becomes a stronger customer demand in many industries. Companies will need to have an aggregate view of orders, inventory, warehouse, distribution and transportation. He says upgrading back-office systems is one way to provide the foundation for information sharing throughout the supply chain.

Sutherland adds, "Right now we know what it takes and we have the enabling technology for an integrated logistics network, but there's not always the commitment from upper management."

#### **CHANGING 3PL RELATIONSHIPS**

As part of an integrated strategy, an increasing number of companies use 3PLs to manage logistics, ranging from transportation, distribution, freight forwarding and warehousing. Because of this reliance on 3PLs, Wilcox says the relationship between supply management organizations (which he collectively calls "shippers") and 3PLs is critical to meet future company and consumer needs.

Capgemini's 3PL study finds 67 percent of shippers surveyed are increasing their use of outsourced logistics services, and 26 percent report a return to insourcing many of their logistic activities. However, 53 percent say they are reducing or consolidating the number of 3PLs they use.

Most 3PL-shipper relationships remain transactional and cost-focused, he says. The Great Recession prompted both shippers and 3PLs to re-examine what accounts, customers and services are profitable and to be more specific and pragmatic about what they expect of each other and the relationship they desire.

"Many want a more collaborative partnership, but I don't think we are quite there yet," Wilcox says. He says transactional, operational and repetitive activities are the most outsourced, while the more strategic, IT-intensive and customer-facing are outsourced to a lesser degree.

During workshops for the 3PL study, Wilcox says there was increased interest and acceptance of 4PL services, which could also change the evolving relationships of shippers and 3PLs.

Global economic pressures, transportation service rate increases and expanding cloud technology could all lead to nontraditional services providers such as 4PLs in the future, Wilcox notes. A 4PL would be a lead logistics provider – a virtual or non-asset based company – that would be a single interface between the client/shipper and multiple logistics providers.

"A 4PL could piece together all the players, offer consistent service and look for the most cost-effective providers," he says. The 4PL is an evolving operating model, but one that could be more dominant in future years.

#### LOOKING TO THE FUTURE

There are many other issues supply management practitioners could be tackling in the future, including rearranging logistics networks as nearshoring takes hold and properly managing global risk throughout the supply chain. But no matter the challenge, it's clear that as companies continue to compete on a global scale, their logistics networks will be a key differentiator in meeting customer needs and helping complex supply chains function efficiently and effectively.

Mary Siegfried is a senior writer for Inside Supply Management<sup>®</sup>.



### A Beginner's Guide to Hazmat

Getting ready to ship hazardous materials? Maybe you're shipping them already and don't even realize it. Here are the basics you need to know to ship safely and comply with current regulations.

#### **By Merrill Douglas**

hen you move hazardous materials, you face two kinds of risk. One is that your freight will trigger a disaster—a toxic spill, an explosion, or a fire. The other is that you'll run afoul of hazmat transportation regulations. Even if the goods you ship never cause any harm, an audit that finds you noncompliant could saddle you with serious fines.

If you're new to hazmat, or you want a refresher, here's an introduction to the basics, plus advice from the experts.

#### **THE BASICS**

A hazardous material is a substance or material capable of posing an unreasonable risk to health, safety, and property when transported in commerce, according to the U.S. Department of Transportation. The DOT is just one of many bodies that regulates hazardous materials, also known in much of the world as "dangerous goods." The United Nations develops model rules for hazmat transportation; governments and transportation organizations worldwide use these rules as the basis for their own regulations.

Through its work, the UN provides an objective and consistent way to classify hazardous materials. "By doing certain tests, you can measure whether or not your products fall within the UN's definition," says Larry Bierlein, an attorney whose practice focuses on hazmat regulation, and who serves as general counsel to the Association of Hazmat Shippers (AHS) in Washington, D.C.

The UN's system divides hazardous materials into nine major classes, most with two or more subclasses (*see side-bar, page 105*). Each class and subclass comes with its own set of rules.

Different rules also apply to different transportation modes. For example, hazmat shipped by air often has extra packaging requirements that don't apply to ground or ocean transportation. "Products shipped by air might need to have special provisions to meet pressure requirements, for example, or accommodate the way the plane moves up and down," says Gary Lindsey, a senior executive account manager with the Dangerous Goods Division of Berlin Packaging in Bridgeville, Pa.

Hazmat regulations from the U.S. DOT, Transport Canada, the International Air Transport Association (IATA), the International Maritime Organization (IMO), and other bodies follow the UN's lead. Each tailors the rules to some extent, but the general trend is toward worldwide harmonization.

To comply with the regulations, shippers have to first recognize that they're moving hazardous materials, classify them correctly, and learn which rules apply. Then they need to meet requirements in three major areas-training, packaging and marking, and communication with the carrier.

#### **IS IT HAZMAT?**

If your company makes chemicals, or uses them in production, you probably know which ones fall under hazardous materials regulations. "When scientists or other compliance experts are part of a company's research and development process, it's their responsibility to identify if an item is hazmat," says Forest Himmelfarb, vice president, software and services, at Labelmaster, a Chicago-based firm that offers labeling, placards, packaging and software for hazmat compliance.

But shippers might not realize hazmat regulations also cover products that aren't industrial chemicals. "One example might be aerosols you bought from an office supply store and are now distributing across the company," says Tom Ferguson, director of technical services at Currie Associates, a Queensbury, N.Y.-based company that provides hazmat training, auditing, and consulting. They could be cosmetics moving to retail stores, or lithium batteries loaded inside laptop computers.

You might neglect those products if you confuse hazmat regulations—which apply strictly to goods in transit—with regulations on dangerous substances from the Occupational Safety and Health Administration (OSHA) or the Environmental Protection Agency (EPA). The lists of substances that those agencies regulate overlap, but they're not identical.

#### A TOUCH OF CLASS

Besides confirming a substance falls under hazmat rules, shippers have to classify it to determine which rules apply.

For many companies, the starting point for hazmat classification is the Safety Data Sheet (SDS) they receive from the supplier of a hazardous substance. The SDS–a document governed by OSHA–explains what the material is made of and what dangers it may pose, and provides instructions for safe handling.

But the SDS is not a foolproof guide. "Sometimes the document arrives with incorrect data," says Dale Kettler, hazardous materials compliance manager at Cabela's, an outdoor sports equipment retailer in Sidney, Neb. Cabela's relies on well-trained employees in its distribution centers (DCs) to notice discrepancies. "Then we'll do a little more investigation."

Also, not every hazardous product comes with an SDS. Many exceptions are what the hazmat regulations call articles or devices, which fall outside OSHA's purview. Lithium batteries, automotive airbags, and self-inflating life vests are examples.

One of the best ways to learn to identify and classify hazardous materials is to read the regulatory documents. For ground transportation in the United States, the rules reside in Title 49 of the Federal Code of Regulations (49 CFR). For most air carriers, the hazmat "bible" is the IATA Dangerous Goods Regulations manual.

Aviall, a Dallas-based Boeing company and leading provider of new aviation parts and aftermarket services, maintains an in-house team of experts to identify and classify the hazardous materials it ships. These materials include additives, adhesives, cleaning products, deicers, greases, lubricants, oils, paints, and sealers.

"Our Environmental Health and Safety team inspects every item Aviall offers for an initial hazard determination," says Jon Pelis, manager of dangerous goods compliance at Aviall, which also provides aftermarket supply chain management services. "This data is captured in our SAP enterprise resource planning system, and is validated upon receipt by Aviall's trained chemical receiving personnel, and again by our shippers."

#### WHAT MODE, AND HOW MUCH?

Once you know what kind of hazmat you're shipping, you can focus on just the rules that pertain to those products. You also need to bear in mind your modes of transportation, and whether your shipments are international or strictly domestic.

The answers to those questions determine which regulations you'll have to study. "To be compliant, everyone needs to have

the appropriate book and not assume that all agencies are identical," says Bierlein. "There are differences."

In addition, you have to consider the units in which you're shipping a hazardous material. Different regulations might apply to substances shipped, for example, in a bulk tank or in retailsized bottles.

"The smaller the package, the more confusing the regulations," says Bierlein. Materials shipped in units defined as "limited quantities" fall under less-stringent packaging requirements, even if you're shipping a full truckload of those units. Materials



Aviation parts and aftermarket services provider Aviall maintains an inhouse team of experts to identify and classify the hazardous materials it ships, and operates local warehouses to meet shipper requirements.

shipped in even smaller units, such as sample vials, are called excepted quantities, and subject to even less regulation.

But exemptions don't apply to every material. One case in point is a small cylinder of compressed gas used to fuel a camping stove. "That would have to be shipped by the manufacturer under special labeling, generally under a special permit," says John Storlie, a partner in consulting firm Retail Environmental Solutions, LaCrosse, Wis.

And the definition of unit size can be tricky. For example, one rule relaxes the regulations for shipping liquefied petroleum gases that come packaged "in containers of not more than four fluid ounces capacity (7.22 cubic inches or less) except cigarette lighters," Kettler says. It took a DOT audit to reveal to

Cabela's—and to pretty much everyone else who shipped the same product—that the exception didn't cover 3.8 ounces of gas in a container large enough to hold 10 ounces. The size of the container nullified the exception.

"The key word in the exception was capacity," Kettler says. The lesson learned was to take every regulation literally.

Shippers looking for an easier path through the complex web of hazmat regulations might turn to technology for help. Labelmaster, for example, offers the cloud-based Dangerous Goods Information System (DGIS) to help hazmat shippers apply the right regulations to the right shipments.

Large carriers such as UPS and FedEx encourage customers to use the hazmat expertise built into their automated shipping systems. "These will not only tell you what hazmat products you have and how they have to be packaged, but will also print the right documents," says Bierlein.

#### **GETTING COURSEWORK ON COURSE**

Although it's important to study the regulations, it takes more than that to establish a compliant hazmat transportation program. Everyone involved in that program must also take formal training.

In the United States, the DOT requires a company to train and test all employees involved in shipping hazmat, and to retain training records. All those employees must receive general awareness training to make them familiar with hazmat regulations. They must also receive training tailored to their specific jobs, plus safety training to prepare them for possible accidents. The company must re-train its hazmat employees every three years.

Training can be delivered in a variety of ways, either in person or online. Himmelfarb favors the classroom for first-time instruction. "The hazmat regulations are so complicated, you need an intensive, instructor-led course to be able to understand them and learn how to comply," he says. "Recurrent training can be done through an online learning platform, if it's prepared well."

But not every company can afford face-to-face training. "Most of my clients like to have training in their automated learning management system, using computer-based learning modules," says Storlie. "It's a great way to keep track of who has been trained, and keep those records in place for compliance."

Hazmat managers at the bulk division of truckload carrier Schneider take a course from the Transportation Safety Institute at the DOT Training Center in Oklahoma City, says George Grossardt, the division's senior vice president and general manager, in Green Bay, Wis.

Even when shippers develop a strong hazmat training program, they might err by failing to extend it far enough. "The most common mistake in retailer logistics programs is not providing adequate training to enough of the staff," says Storlie. Employees who pick items from cases, and pack them together for shipment to stores, must study hazmat requirements if any of those items fall under hazmat regulations.

"Those materials have to be compatible," Storlie says. "They have to be in the proper packaging, and correctly labeled and marked."

At Aviall, all employees in operations take general hazmat training, even if they don't handle hazmat materials, so they can identify potential problems in their areas. "The Aviall hazmat curriculum covers a 23-point training program that goes above and beyond generic certification courses," says Pelis.

To reinforce the lessons provided during training, Kettler's

department at Cabela's creates procedures manuals for preparing hazmat shipments. "They give step-by-step instructions, with pictures, for the proper way to pack and ship each individual hazardous item, based on the product's classification," he says.

#### **DRUM, BOTTLE, BOX**

Depending on what you ship, and how much, hazardous materials might move in anything from a bulk tank container to a 55-gallon drum to a small plastic, metal, or glass container or corrugated box-or in some combination thereof. The regulation books spell out how to pack each class and subclass of hazmat, and what markings to put on the packaging.

Beyond understanding the packaging instructions, it's also important to know

about the relevant exceptions. "If companies get strategic about that-maybe by changing the quantities they're shipping-they can see big cost savings," notes Himmelfarb.

When a shipper works with Berlin Packaging Dangerous Goods Division, a consultant helps the company choose the right packaging and figure out the workflow required to assemble those units. "And then you have to make sure you have the right closure equipment in place, such as torque wrenches, so you're meeting all the specifications prescribed for the package," adds Steve Sowa, the division's director of business development.

Whether they call for a wrench, a specific kind of tape, or another mechanism, it's important to follow the manufacturer's instructions to the letter. "We've seen a lot of oversight and enforcement over the past several years based on package closures," says Ferguson.

After you close a package correctly, you must also label it to indicate the type of hazard inside. The regulations dictate the label formats. For example, the label for a gas that's an inhalation hazard shows the number 2 (for the gas classification), the

words "inhalation hazard," and a skull and crossbones.

Companies that import products must be especially vigilant about packaging and labeling. Outside North America, Europe, and Japan, compliance with packaging and labeling regulations can be spotty. If a supplier takes a shortcut, that could spell big trouble once the product arrives stateside. "Then you have a package moving across U.S. roads that doesn't meet the q uality standards," says Bierlein.

Sowa at Berlin Packaging recommends several other best practices. For example:

Ship the package as it was tested. If it has multiple com-

ponents, you have to make sure every component is used when you put the shipment in transit.

When you're shipping liquid, make sure you have a leak-proof secondary container.

Use enough cushion and absorbent, especially if you're shipping by air, depending on the level of chemical you're declaring.

Make sure you have the proper pressure test documentation for air shipments.

#### **GET IT ON PAPER**

Hazmat packaging rules are designed to prevent mishaps. But, of course, mishaps do occur. That's where the rules on documentation and signage come in.

Hazmat travels with a special bill of lading (BOL) that includes information

such as the classification, quantity, and type of packaging.

The carrier uses this information, in part, to stow the freight safely. "For example, some materials on a truck can't be next to each other, and some materials traveling by ocean can't go below deck," says Bierlein.

The BOL also must provide a phone number the driver can call in case of a traffic accident, leak, or other emergency. It's important to highlight this emergency contact information, so the driver or a public safety officer can spot it quickly. "If the driver is incapacitated, the BOL has to be accessible, and that information has to be clearly articulated, so an emergency responder knows how to react," says Grossardt at Schneider.

Following an accident, the emergency contact person can tell first responders the safest way to contain a leak, fire, or other danger involving the hazardous freight. "The product might react poorly to water, for example," Grossardt says. Many shippers outsource the job of emergency contact to third-party service providers, he adds.

If the load is large enough, the shipper must also give the



flammable, and poisonous)

Other flammable substances

Toxic and infectious substances

5. Oxidizing substances and

2. Gases (non-flammable,

3. Liquids (flammable

and combustible)

organic peroxides

7. Radioactive substances

8. Corrosive substances

9. Miscellaneous

1. Explosives

carrier a placard that replicates the hazmat label. Mounted on a trailer, intermodal container, or other conveyance, the placard tells first responders at a glance what kind of hazard they're dealing with. Responders then check the paperwork for more detail.

Placards are the shipper's responsibility, but sometimes shippers forget them. To avoid problems, each Schneider driver who hauls bulk hazmat travels with a suitcase full of placards. "I'd like shippers to do a better job of making sure they have the right placards when the order leaves the facility," says Grossardt.

#### **POTENTIAL PENALTIES**

To make sure shippers take hazmat regulations seriously, the DOT and other agencies impose financial penalties for violations. These can vary greatly. For example, in 2013, the DOT assessed a penalty of \$505 against a company that had failed to provide initial and recurrent hazmat training to employees. In 2014, it

"If you shipped a lithium battery per all the regulations five or six years ago, and then jumped ahead to today and tried to do it the same way, you'd be non-compliant."

proposed a civil penalty of \$238,000 against a company that had offered two small packages of hazardous materials to FedEx without declaring them. One package contained eight liters of a corrosive material; the other contained 12 fluid ounces of a flammable material.

Companies shipping hazmat by any mode should carefully comply with all regulations. But mistakes are most likely to come to light when shipping by air. "The airlines are required to inspect every shipment, so undeclared or improperly declared hazardous materials show up a lot more often," says Ferguson.

One further challenge hazmat shippers face is keeping up with changes in hazmat rules. "The regulations are moving targets," says Ferguson. A training refresher every three years might not be enough to keep employees up to date. "A new regulatory requirement might come along in six months," he says.

Regulatory changes in the hazmat world are different from changes in, say, the rules that govern hours of service for truck drivers. They're not big, discrete changes that affect everyone. Rather, they're a collection of many small modifications. Some will apply to a given company; others won't.

The United Nations meets every two years to modify its model hazmat regulations. In January 2015, the U.S. DOT released a

document, more than a half-inch thick, that incorporates those changes into its own rules.

Regulators rarely make large changes to the hazmat rules. "The system has been in place pretty much as it is since the 1970s," Bierlein says.

One thing that has seen significant change, though, is the set of rules on lithium batteries. "If you shipped a lithium battery per all the regulations five or six years ago, and then jumped ahead to today and tried to do it the same way, you'd be non-compliant," Ferguson says.

A good way to keep up is to find an ally who continuously tracks hazmat regulations. "Get involved with a consultant or, perhaps even better, a trade association that provides routine updates," says Ferguson. Along with AHS, the Council of Safe Transportation of Hazardous Articles (COSTHA) and the Dangerous Goods Advisory Council (DGAC) represent hazmat shippers. Trade associations for specific industries also follow

hazmat issues for their members.

At Cabela's, Kettler relies on a variety of industry groups and publications to stay up to date on regulatory changes. "We also monitor the Pipeline and Hazardous Materials Safety Administration (PHMSA-part of the U.S. DOT) site for proposed rulemaking," he says. "In addition, I'm a member of the Retail Industry Leaders Association (RILA) compliance committee, which shares information on rulemakings and issues that pertain to the retail environment."

Technology can help, too. An online compli-

ance system such as Labelmaster's DGIS always incorporates current regulations. "We have a regulatory department that keeps up with changes, and makes sure the software is up to date," Himmelfarb says. Even if the shipper doesn't know that a rule has changed, the software will prepare the shipment correctly.

#### **COMPETITIVE ADVANTAGE**

Like hazmat products themselves, the field of hazmat compliance may seem fraught with danger. But hazmat travels safely on our roads and rails, and across the seas and skies, every day. With proper attention to training, process, and packaging, a shipper can navigate the perils of hazmat regulation and reach the other side all in one piece.

In fact, a strong hazmat program can actually strengthen a company's position in the marketplace. "If managed properly, compliance built into operational processes increases efficiency while providing safe packages to our customers," says Pelis at Aviall. "Compliance and productivity must coexist. When they do, everybody wins."

Merrill Douglas is a senior contributing editor for Inbound Logistics.

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### **Supply Chains in Crisis**

As the deadly Ebola outbreak threatened West Africa, a team of medical, humanitarian and logistics experts teamed up to respond to the deadly virus. The lessons learned by the team could provide a logistics blueprint for handling future crises.

#### By Jarrod Goentzel and Ian Heigh

URING THE RECENT DEADLY EBOLA OUTBREAK, A UNIQUE group of experts and organizations formed a supply chain to improve the delivery of humanitarian aid. New supply chains often emerge during a crisis, relyingdo you on processes honed by professionals over the years. This Ebola effort leveraged the strengths of new and traditional groups through a coordination model that companies have long used – supply and demand planning, early and often.

As the Ebola epidemic spread in 2014, resources were appropriately focused on setting up Ebola treatment units while hospitals that provide other critical services were closed or severely constrained. Consequently, healthcare workers lacked enhanced training on infection protection and control (IPC) for Ebola and the personal protective equipment (PPE) supplies to safely deliver healthcare services despite lethal infection risk. Doctors at the University of Massachusetts Medical School (UMMS) and Boston's Children's Hospital, who had worked with the Ministry of Health in Liberia for more than seven years, together with their colleagues at the Liberia College of Physicians and Surgeons (LCPS), sought to fill this gap in training and equipment. Realizing that the supply chain was critical, the medical specialists also teamed up with experts from the Center for Transportation and Logistics at the Massachusetts Institute of Technology and from Avenir Analytics, a firm that specializes in supporting humanitarian agencies in response planning and implementation. Together they formed the Academic Consortium Combating Ebola in Liberia (ACCEL).

ACCEL proposed an intervention to provide IPC training coupled with three months of appropriate supplies to protect healthcare workers in hospitals prioritized by the Liberia Ministry of Health. The operation began in November 2014 with a grant from the Paul Allen Tackle Ebola Initiative.

#### **PLANNING A CRISIS RESPONSE**

While it's common for businesses to plan operations based on actual demand or agreed-upon sales forecasts, the practice is less evident in international emergency response. Donors typically release funds after the onset and ramp up aid in the immediate aftermath. With limited funding to mobilize resources initially and time pressure to deliver assistance quickly, organizational planning between technical programs and the supply chain is often overlooked.

In contrast, ACCEL experts combined knowledge of the Liberian health community and of commercial and humanitarian logistics capacity to plan its response from the start. The medical program director, international supply chain director and Liberian supply chain director met in Boston in November 2014 to draw up a plan. The initial plan included three main components.

1) Scope and implementation. ACCEL worked directly with the Liberian Ministry of Health to prioritize efforts based on budget constraints, selecting 16 of 21 government hospitals. Hospital staff training used a curriculum developed by the health ministry for safe care and sanitation. Training was delivered in each facility over one week by specially trained LCPS/ACCEL teams consisting of a doctor, midwife, water-sanitation technician and a psycho-social expert. ACCEL also provided three months of consumable and reusable personal protective equipment, and water and sanitation (WASH) items, which arrived simultaneously with the team.

2) Demand plan. The medical program director combined knowledge of current Ebola protection requirements with seven years of experience in Liberian hospital facilities, which was critical in determining specifications for and quantities of PPE and WASH commodities. Quantities were based on several factors, such as the number of hospital beds, surgeries, childbirths, Ebola emergencies expected, and healthcare and sanitation workers. Teams classified hospitals as large, medium and small, delivering standard kits for each.

3) Supply plan. The demand plan provided a basis for calculating supplies required over time and specifying necessary operational assets. The supply chain design incorporated resources already in place and knowledge of existing operations to reduce duplication and setup time. For example, the Logistics Cluster, a coordination body established by the international humanitarian community, worked with the Liberian government to establish a warehouse and distribution system. In addition, the health ministry, with assistance from the Clinton Health Access Initiative, tracked Ebola commodities (both in stock and planned) with a weekly interagency supplies/pipeline spreadsheet.

#### **INTERNATIONAL PROCUREMENT**

With the initial plan in place, and a mid-January 2015 training launch agreed on by the government, ACCEL conducted an RFP for the complete set of supplies required. Precise product specifications were difficult to determine, as several standards for treatment were circulating. Reference to standards, such as ISO 16603 for clothing that protects against contact with blood and body fluids, helped link specifications across health organizations and with manufacturer offerings. Ensuring that all products met standards was especially critical given the life or death risks of product failure.

Approved suppliers for UMMS were invited to bid. One largescale commercial distributor stood out in its ability to provide a complete catalog of PPE and WASH items with relatively short lead times. The distributor used relationships with a large network of manufacturers to find capacity for products in high demand. Using a supplier with a catalog preapproved for the medical school's procurement organization saved significant time. The distributor's warehouse was able to consolidate the large shipment for international transportation.

The time line dictated air transportation, although capacity was constrained because most commercial airlines had suspended operations into Ebola-affected countries. ACCEL used new airbridge capacity that emerged through the efforts of Airlink, which also received a Tackle Ebola grant from Paul Allen. Airlink established the air bridge from the United States and Europe directly into West Africa. The Liberian government's National Ebola Command Center established a clear process to quickly facilitate customs clearance for all humanitarian aid shipments. As a result, the deployment of supplies was rapid – the MD-11 charter with ACCEL cargo departed Miami on January 11, 2015, and the first hospital delivery was completed the morning of January 16, 2015.

#### **IN-COUNTRY OPERATIONS**

Effective execution relied on the capabilities of the ACCEL staff and its partners in Liberia. The Liberia College of Physicians and Surgeons' existing capabilities and relationships in-country helped ACCEL quickly set up operations. Because the college



focuses on teaching, setting up an operational agency with a supply chain required specialized support from logistics professionals. After recruiting a national logistics manager, warehousing and transport officer, procurement officer and head driver, the logistics team developed the following three core processes.

1) Local procurement. To save costs and ensure products were appropriate for the context, the team purchased 13 of the 68 SKUs locally. It also established an auditable process for local procurement, based on rules used by the LCPS to ensure compliance with national requirements.

2) Warehousing and transport. ACCEL established an agreement with the Logistics Cluster to accept internationally and locally procured PPE and WASH supplies in the central store in Monrovia, the capital of Liberia. The cluster also provided trucks to move goods to each location. ACCEL worked closely with the cluster team and submitted service requests to plan receipts and dispatches in advance.

3) Fleet services. Safe transport was crucial for the training teams traveling throughout the country, and it was determined that ACCEL needed nine 4WD vehicles. Through an innovative arrangement, the United Nations Mission for Ebola Emergency Response transferred eight vehicles from other U.N. operations in the region to ACCEL, which were inspected, repaired as needed, and equipped with safety kits, communication systems and tools. It also established maintenance and fueling contracts, and its drivers were trained and tested on standard procedures.

Standard forms (electronic and paper) and spreadsheet tools were developed to support and track the processes. Data were consolidated in a weekly report to provide management with progress updates.

After the first few weeks, the health ministry requested expansion of the program from the original 16 to all 21 hospitals. The logistics costs, which represented more than 70 percent of the original budget, were tracking well under budget due to procurement savings, operational efficiencies and contributions from partners. These savings, combined with Ministry of Health supplies identified in the interagency supplies/pipeline spreadsheet, enabled ACCEL to cover all 21 hospitals with the original budget by the third week of March 2015.

#### **MAKING A DIFFERENCE**

The training and supplies had a major impact on the Liberian health system. By the end of March 2015, more than 2,200 healthcare and sanitation workers were trained and equipped to safely provide health services. Several hospitals that had been closed were reopened. The minimum standards for safecare provision, as measured by a checklist established by the Liberian health ministry, increased from 61 percent to 86 percent after the first round of training. Most important, thousands of patients had access to health services that otherwise would not have been available from January through March 2015. The ACCEL supply chain procured more than 70 metric tons of supplies, internationally and locally, and delivered them to hospitals across the country within 12 weeks. By the end of March, the vehicle fleet had safely transported ACCEL teams nearly 35,000 miles. Team capabilities combined with budget savings allowed improvements to hospitals, including construction or modification of Ebola triage areas, construction of safe waste-disposal incineration facilities, rehabilitation of water systems and deployment of shipping containers for supplemental storage.

#### LESSONS LEARNED

This Ebola-response supply chain brought together a mix of development and humanitarian emergency experts, each with important core competencies for the situation. They further leveraged international and national service providers, both commercial and humanitarian, in operating the supply chain. Combining expertise and tailoring partner capacities was possible because of the demand and supply plan devised at the start and updated through the implementation.

The rapid scale-up of operations relied on a capable in-country organization. LCPS provided a solid foundation of human resources, standard processes and key partnerships to ramp up operations. It also provided a link to the Ministry of Health to ensure the intervention was coordinated with other initiatives. The school was able to set up and manage its supply chain using a simple design provided by experienced logistics professionals and supplemented by control mechanisms to ensure goals were achieved.

The efforts of the ACCEL team have contributed to the work of other aid agencies in supporting the government of Liberia to contain the Ebola outbreak, although critical work remains to achieve zero new Ebola cases in West Africa. ACCEL training teams are making second visits to each hospital to refresh training, train workers who were not available during the first round, assess the quality of new practices and determine supply consumption under these guidelines.

Even the most resilient supply chains will occasionally be overwhelmed by a crisis. The ACCEL supply chain was designed to be rapid and temporary, building on local capacity to provide a boost for government systems that were overwhelmed. Consistent and coordinated demand and supply planning was a key component in maximizing the impact of the project. Investment in planning and information systems, and in training professionals to use them, is essential for supply chains to keep pace with the aggressive viruses of the future and other challenges in delivering assistance to people in need.

Jarrod Goentzel is director of the MIT Humanitarian Response Lab in the Center for Transportation and Logistics at the Massachusetts Institute of Technology in Cambridge, Massachusetts. Ian Heigh is head of planning and operations support for Avenir Analytics, which is based in Lamaca, Cyprus.



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